

What is claimed is

- 1        1.        In combination, a light source and a subject, wherein  
2                the light source has an illumination spectrum characterized by one of a  
3                distinctively stronger emission peak at a predetermined wavelength compared  
4                to other wavelengths, and a distinctly weaker emission gap at the  
5                predetermined wavelength compared to said other wavelengths; and,  
6                the subject has a reflection spectrum characterized by one of a  
7                distinctively stronger reflection peak at the predetermined wavelength  
8                compared to said other wavelengths, and a distinctly weaker reflection gap at  
9                the predetermined wavelength compared to said other wavelengths;  
10               wherein the subject has a distinct appearance when illuminated by the  
11               light source due to one of a match and a mismatch between the illumination  
12               spectrum and the reflection spectrum.
- 1        2.        The combination of claim 1, further comprising at least one of a further  
2               light source and a further subject, said at least one of the further light source  
3               and the further subject being characterized by a different one of said match and  
4               said mismatch between the illumination spectrum and the reflection spectrum  
5               thereof, whereby the match and the mismatch can be compared to the different  
6               one of said match and said mismatch.
- 1        3.        The combination of claim 2, wherein the illumination spectrum of the light  
2               source has a plurality of narrow peaks that add to at least partly illuminate the  
3               subject over a range comparable to a broadband source, and wherein the  
4               distinct appearance of the subject is a color shift relative to broadband  
5               illumination arising from the reflection spectrum having a reflection gap matched  
6               to one of the narrow peaks of the source.
- 1        4.        The combination of claim 2, wherein the reflection spectrum of the  
2               subject is characterized by one of peaks and bandgaps, that are separated by

3 one of nonreflective gaps and reflective bandwidths respectively, wherein  
4 reflection of the subject is a result of adding together bands of the illumination  
5 spectrum that correspond to bands of the reflective spectrum, and wherein the  
6 distinct appearance of the subject is a color shift arising alternatively from the  
7 reflection spectrum of the subject including and not including bandwidths that  
8 are matched and mismatched between the subject and the source and the  
9 further source.

1 5. The combination of claim 4, wherein the illumination spectrum of the light  
2 source has narrow peaks corresponding to primary colors that add to illuminate  
3 the subject, and wherein the distinct appearance of the subject is a color shift  
4 arising from the reflection spectrum having at least one said reflection gap  
5 preventing reflection of the subject at least at one of the primary colors.

1 6. The combination of claim 5, wherein the illumination spectrum has at  
2 least red, green and blue peaks and wherein the reflection gap of the subject  
3 substantially corresponds to the green peak.

1 7. The combination of claim 5, wherein the illumination spectrum has  
2 discrete illumination peaks in a visible color spectrum and the further light  
3 source comprises a broadband source with a substantially continuous  
4 distribution of light energy through the and adjacent to the reflection gap,  
5 whereby illumination of the subject using the broadband source matches the  
6 reflection spectrum adjacent to the reflection gap, thus concealing the reflection  
7 gap under the broadband source.

1 8. The combination of claim 1, wherein the distinct illumination peak  
2 corresponds to a primary color and further comprising at least one additional  
3 distinct illumination peak that sums with the primary colors to afford simulated  
4 broadband illumination by summing primary colors, and further comprising a  
5 second light source with a spectrum having a gap at the predetermined

6 wavelength, whereby the primary color is switched in and out by shifting  
7 between the first and second light source.

1 9. A method for producing a visible change in appearance, comprising the  
2 steps of:

3 providing a subject with a pigmentation having at least one discrete  
4 absorptive band within a reflective spectrum;

5 illuminating the subject with a first light source having an illumination  
6 spectrum encompassing the reflective spectrum of the pigmentation,  
7 whereupon the subject has an appearance that is nominal;

8 subsequently illuminating the subject with a second light source  
9 characterized by an illumination spectrum with discrete illumination bands,  
10 wherein at least one of the illumination bands overlaps the absorptive band of  
11 the pigmentation, thereby visibly changing the appearance of the subject.

1 10. The method of claim 9, wherein the discrete illumination bands of the  
2 second light source include primary color wavelengths having peak amplitudes.

1 11. The method of claim 10, wherein the primary color wavelengths include  
2 red, blue and green visible wavelengths and the at least one absorption band of  
3 the pigmentation encompasses at least one of the primary color wavelengths.

1 12. The method of claim 11, wherein the absorption band of the  
2 pigmentation and the illumination bands of the illumination spectrum each  
3 comprise a primary color wavelength having a full width half maximum  
4 bandwidth of about 10nm.

1 13. The method of claim 12, wherein the illumination spectrum includes red,  
2 green and blue illumination bands and the absorption band of the pigmentation  
3 consists of one of a red, green and blue band overlapping a corresponding one  
4 of the illumination bands.

1        14.    The method of claim 13, wherein the overlapping band is a green band.

1        15.    The method of claim 13, wherein the overlapping band is a blue band.

1        16.    The method of claim 13, comprising producing the pigmentation of the  
2        subject by incorporating in a surface of the subject at least one rare earth  
3        composition having at least one characteristic absorptive band corresponding  
4        substantially to at least one of about 440nm (blue), 545nm (green) and 611nm  
5        (red).

1        17.    The method of claim 16, wherein the at least one characteristic  
2        absorption band and a corresponding said illumination band are provided by  
3        discrete spectral peaks having a full width half maximum bandwidth of about  
4        10nm.